Size Characteristics of Larger Academic Human Environmental Health Programs in the United States

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We have performed a benchmark exercise evaluating larger academic programs in human environmental health sciences. These programs are located at schools of public health and at other institutions that have NIEHS Centers of Excellence. The largest programs were those in which there was both an NIEHS center and a public health graduate education program. This suggests that there is synergy between environmental health sciences research and involvement in public and community health. *Key words*: environmental health programs, NIEHS centers, schools of public health. *Environ Health Perspect* 106:615–617 (1998). [Online 31 August 1998] *http://ehpnet1.niehs.nih.gov/docs/1998/106p615-617goldstein/abstract.html*

As part of a recent review of the Environmental and Occupational Health Sciences Institute (EOHSI) by our sponsoring universities, we borrowed a process from industry to benchmark ourselves in comparison with other academic environmental health sciences programs that focus primarily on human health. The results of this analysis provide a snapshot of the size and scope of the larger academic programs of this type in the United States.

We made the assumption that major environmental health programs would be located at one of two locations: schools of public health, which are required to teach environmental health for their accreditation, or at institutions that have been designated as NIEHS Environmental Health Sciences Centers.

Schools of public health have a long and proud tradition in environmental health sciences, beginning decades ago with sanitary engineering and evolving into programs responsive to current environmental health concerns. Under the guidelines of the Council of Education in Public Health (CEPH), each school of public health must offer core teaching in environmental health as one of the five areas of knowledge considered to be basic to public health. Specifically, the CEPH accreditation document (*1*) lists the requirement that each master's of public health (M.P.H.) student receive course work in "environmental factors including biological, physical, and chemical factors which affect the health of a community." Many of the schools of public health also offer master's or doctoral degrees in fields related to environmental health, such as toxicology.

NIH-supported environmental health science research centers actually predate the founding of the NIEHS in 1969. Two of the first centers were at the Harvard School of Public Health and the New York University School of Medicine. The NIEHS centers program has evolved to now include broadly designated centers of excellence, receiving approximately $1 million yearly in research support funds, and smaller marine/freshwater programs. In recent years there has been further competition for these NIEHS centers, with new centers being formed and older ones losing their designation. Our information is from those centers that were active in late 1996.

Our goal is to provide a brief description of existing programs in the aggregate. Given the heterogeneity among universities in the organizational approaches toward environmental health sciences and the different sources we have used to obtain this information, we do not believe our methodology is of sufficient strength to justify ranking individual institutions.

Methods

A detailed survey was sent out in October 1996, and a second survey was sent out to the nonrespondents in January 1997. The remaining information was extrapolated from annual reports and program catalogs. We made phone calls to directors and administrators of programs whose information we did not receive.

We also used the Internet to search for other institutions with environmental and occupational health sciences programs. We identified 121 programs, some of which were multiple programs at the same institutions. We did not include these Internet-identified programs in our compilation because the data that we obtained did not indicate sufficient faculty size to warrant inclusion. However, we note that, overall, these smaller programs may be of great significance.

Results

In Table 1 we show data on the 16 institutions with NIEHS centers other than the marine/freshwater centers. Five of these centers are associated with an accredited school or program of public health. The average number of environmental health faculty among this group was 37.5, with a range of 10–70. The average amount of external funding was $9.8 million (range $2.1–$17.3 million).

Table 2 contains the data for all 24 schools of public health within the 50 states. The average number of environmental health faculty was 17.5 and the range was 3–59. The average amount of external funds was $4.6 million and the range was $0.09–$13.0 million.

In Table 3 we list the five institutions that have both an NIEHS center and a school or program of public health and are therefore tabulated in both Tables 1 and 2. The average number of environmental health faculty associated with these programs is 35 and the range is 12–59. With regard to funding of this group, the average amount of external funds received was $12.2 million, with a range of $5.5–$17.3 million.

Although we are a program in public health, not a school of public health, we have included ourselves among the academic programs that have both a school of public health and an NIEHS center. We believe this is justified, as our program is fully accredited to award the M.P.H. degree by the Council on Education for Public Health and we have three doctoral degree programs in environmental health science. We are also well within the overall size range of schools of public health and above average in terms of number of environmental health science faculty and M.P.H. students who major in environmental and occupational health. The one highly significant distinction in not being a school of

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Table 1. Programs with NIEHS Environmental Health Sciences Centers

	Environ health faculty (*n*)	Environ health students (*n*)[a]	Building	External funds[b,c]	University funds[b,d]	Total funds[b]	External funding per faculty member[b]
Mean	37.5	70.6	–	9.8	2.6	13.1	0.31
Median	36.5	70.0	–	9.2	1.5	11.6	0.27
Range	10–70	5–137	–	2.1–17.3	0.03–12	5.7–27	0.05–0.79
SE	4.17	10.56		1.12	0.87	1.69	0.04
Centers							
A1	70	80	No	15.0	12.0	27.0	0.21
A2	60	25	Yes	15.0	3.0	18.0	0.25
A3	59	116	No	13.0	2.0	15.0	0.22
A4	50	33	Yes	4.2	1.5	5.7	0.08
A5	45	129	No	2.1	–	–	0.05
A6	41	137	Yes	17.3	4.2	21.5	0.42
A7	39	121	Yes	14.0	2.5	16.5	0.36
A8	38	5	NA	9.9	1.3	11.2	0.26
A9	35	45	No	7.5	0.5	8.0	0.21
A10	33	88	No	12.0	–	12.0	0.36
A11	31	53	NA	8.5	0.5	9.0	0.27
A12	30	70	Yes	13.0	4.0	17.0	0.43
A13	24	NA	No	5.5	–	–	0.23
A14	23	74	No	6.8	1.3	8.1	0.30
A15	12	50	No	5.5	0.53	6.0	0.46
A16	10	33	No	7.9	0.03	7.93	0.79

Abbreviations: SE, standard error; NA, not applicable.
[a]Includes students listed in catalog (M.S., M.P.H., and Ph.D.).
[b]Dollars in millions.
[c]External funding from government and nongovernment contracts.
[d]University funding from endowments, gifts, and university funds.

Table 2. Schools of public health

	Environ health faculty (*n*)	Environ health students (*n*)[a]	Building	External funds[b,c]	University funds[b,d]	Total funds[b]	External funding per faculty member[b]
Mean	17.5	72.3	–	4.6	1.6	6.0	0.21
Median	12.0	63.0	–	3.0	0.7	3.3	0.20
Range	3–59	3–206	–	0.09–13	0.003–7.8	0.1–17	0.02–0.46
SE	2.78	11.39		0.98	0.5	1.35	0.03
Schools							
B1	59	116	No	13.0	2.0	15.0	0.22
B2	35	206	Yes	8.5	2.5	11.0	0.24
B3	33	88	No	12.0	–	12.0	0.36
B4	32	51	Yes	9.9	5.4	15.3	0.31
B5	30	70	Yes	13.0	4.0	17.0	0.43
B6	30	NA	Yes	8.2	7.8	16.0	0.27
B7	27	200	No	5.0	–	–	0.19
B8	24	104	No	0.7	1.1	1.8	0.03
B9	17	80	No	6.5	1.2	7.7	0.38
B10	15	130	No	3.0	0.6	3.6	0.20
B11	14	NA	No	0.8	0.7	1.5	0.06
B12	12	50	No	5.5	0.53	6.0	0.46
B13	12	73	No	3.6	0.17	3.77	0.30
B14	12	72	No	NA	NA	NA	NA
B15	11	50	No	1.7	0.3	2.0	0.15
B16	9	65	No	2.5	0.5	3.0	0.28
B17	9	61	No	0.82	0.7	1.52	0.09
B18	9	3	No	0.40	–	–	0.04
B19	6	59	No	1.20	0.7	1.90	0.20
B20	6	25	No	0.25	0.003	0.25	0.04
B21	6	12	No	0.60	0.25	0.85	0.10
B22	4	25	No	0.09	0.01	0.10	0.02
B23	4	30	Yes	–	–	0.30	NA
B24	3	20	No	NA	NA	NA	NA

Abbreviations: SE, standard error; NA, not applicable.
[a]Includes students listed in catalog (M.S., M.P.H., and Ph.D.).
[b]Dollars in millions.
[c]External funding from government and nongovernment contracts.
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public health is that we are ineligible to compete for certain Department of Health and Human Services funding programs that are restricted to schools of public health.

Discussion

The focus of the present analysis is on programs for whom human health impacts are the primary consideration. Academic human environmental health is difficult to define, varying from campus to campus with the specific interests of the faculty, the environmental problems of concern in the local area, and overarching campus organizational issues.

We recognize that the heterogeneity of academic organizational approaches to human environmental health sciences may have led us to an erroneous estimate of actual environmental health sciences faculty size and funding on individual campuses. For example, on some campuses there may be a separate clinical occupational and environmental health program that cooperates closely with the major environmental health sciences academic center but, due to departmental constraints, is not listed as part of the program. Similarly, in a school of public health, an epidemiologist active in studying environmental health might be located in the Department of Epidemiology rather than in the Department of Environmental Health and thus be omitted from our compilation. Another example from our own campus is that a few of the faculty from the ecology and environmental science programs participate directly in EOHSI and are included in our compilation, but others are not, including some who cooperate with us in studies related to human environmental health but are not EOHSI members. Accordingly, the tabular information is probably best considered as representative of the size and strength of the major identifiable environmental health sciences campus component rather than the entire environmental health sciences activities of the campus.

Despite these caveats, a pattern for environmental health sciences programs is evident. In general, the largest academic environmental health programs are at institutions with NIEHS Environmental Health Sciences Centers. The average number of environmental health faculty in the NIEHS centers was 38, a little more than double the average number of faculty associated with schools of public health. Although reporting roughly the same number of graduate students, programs with NIEHS centers have on average more than twice the number of faculty than schools of public health. External funding for programs with NIEHS centers is also approximately twice the amount than for schools of public health,

Table 3. Programs with NIEHS Environmental Health Sciences Centers and schools of public health

	Environ health faculty (*n*)	Environ health students (*n*)[a]	External funds[b,c]	University funds[b,d]	Total funds[b]	External funding per faculty member[b]
Mean	35.0	92.2	12.2	2.7	14.3	0.38
Median	33.0	88.0	13.0	3.0	15.0	0.42
Range	12–59	50–137	5.5–17.3	0.53–4.2	6–21.5	0.22–0.46
SE	7.65]	15.6	1.90	0.87	2.59	0.04
Programs						
C1	59	116	13.0	2.0	15.0	0.22
C2	41	137	17.3	4.2	21.5	0.42
C3	33	88	12.0	–	12.0	0.36
C4	30	70	13.0	4.0	17.0	0.43
C5	12	50	5.5	0.53	6.0	0.46

SE, standard error.
[a]Includes students listed in catalog (M.S., M.P.H., and Ph.D.).
[b]Dollars in millions.
[c]External funding from government and nongovernment contracts.
[d]University funding from endowments, gifts, and university funds.

and the commitment of university funds from universities with NIEHS centers is greater than from universities with schools of public health. If we compare programs with both NIEHS centers and schools of public health to those with only NIEHS centers, we see that the number of faculty for programs with both is about the same, but external funds are more than $2.5 million more for programs with both. The average number of students is also greater for environmental health programs with both an NIEHS center and a school of public health.

We recognize that size is a poor criterion for academic excellence. Unfortunately, in this benchmark exercise we were not able to obtain data allowing comparison of more important funding metrics such as peer-reviewed publications and their impacts, review articles, number of faculty members serving as reviewers for prestigious journals, or other traditional indicators of academic venues. One other metric that may have value in providing an indication of peer recognition is external funding, which is often used as criterion for promotion or, in the aggregate, as a requirement for eligibility for center grant proposals.

Assuming that external funding per faculty member is a valid indicator, faculty in programs with NIEHS centers do slightly better in research productivity than do schools of public health ($262,000 vs. $243,000/faculty member). An explanation may be a greater classroom teaching load in schools of public health for master's as opposed to doctoral students, the latter arguably being more helpful in assisting the research process.

The five institutions that are accredited for public health education and also have NIEHS centers have a substantially higher level of external funding per faculty member ($347,000/faculty member). This is consistent with a synergistic interaction between public health and environmental health research. It is also supportive of recent actions by the NIEHS that have led it to expand beyond its basic science foundation to fund community environmental health research and education.

The data also suggest that institutions, either NIEHS centers or schools of public health, that have their own environmental health sciences building obtain larger amounts of external funding. Five out of the 16 NIEHS centers have their own facility, and four of these five are the institutions that receive the largest amount of external funding. The external funding per faculty member in institutions that have their own building is $320,000. The cause and effect relationship between having a building and external funding is unclear. It is possible that institutions that have a clearly identifiable environmental health sciences building may be better able to promote the interdisciplinary research necessary for attracting major environmental health research funding or at least be better able to convince site visitors of their ability to perform such research and of their institutional commitment to environmental health.

References and Notes

1. Council on Education for Public Health. Accreditation Criteria: Graduate Schools of Public Health. Amended October 1993. Washington, DC:Council on Education for Public Health, 1993.